EE5600Assignment01 Problem103 in Lines Planes

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14th September 2020

1 Problem statement:

If the points (1 1 p) and (-3 0 1) be equidistant from the plane (3 4 -12) x = -13, then find the value of p.

2 Procedure:

1. The perpendicular distance of point $P(x_1, y_1, z_1)$ from the given plane $ax + by + cz = 0$ is given by distance $d = \frac{ax_1 + by_1 + cz_1}{\sqrt{a^2 + b^2 + c^2}}$

2. $Point P1 = (1, 1, p)$

3. $Point P2 = (-3, 0, 1)$

4. $Plane : 3x + 4y - 12z + 13 = 0 (as given in the problem statement)$

5. $Let the distance of P1 from plane = D1$

6. $Let the distance of P2 from plane = D2$

7. $As given in the problem statement, P1 and P2 are equidistant.$

8. $If D1 and D2 are made equal, in formula mentioned in (2-1) denominator gets cancelled.$

9. $That implies modulus(ax_1 + by_1 + cz_1 + d) = modulus(ax_2 + by_2 + cz_2 + d)$

10. $In the given problem$

$x_1 = 1; y_1 = 1; z_1 = p; and x_2 = -3, y_2 = 0, z_2 = 1$

11. $Therefore$

$z_1 = \frac{modulus(ax_2 + by_2 + cz_2 + d) - (ax_1 + by_1 + d)}{c}$

12. $In the above formula the values were substituted and value of z_1 is calculated.$

2.1

code is made available in $assignment01_e e20resch14006.ipynb$